DOCUMENT RESUME

ED 203 176 CE 029 344

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TITLE Validation of Auto Mechanics I Curriculum Manual.
INSTITUTION Oklahoma State Dept. of Vocational and Technical Education, Stillwater.
PUB DATE Jun 81
NOTE 58p.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Auto Mechanics; Curriculum; Curriculum Development; *Curriculum Evaluation; *Field Tests; *Program Effectiveness; Program Evaluation; *Program Validation; Secondary Education; *Textbook Evaluation; Vocational Education
IDENTIFIERS Oklahoma

ABSTRACT

A field test evaluated "Auto Mechanics I" curriculum materials developed and published by the Curriculum and Instructional Materials Center, Oklahoma State Department of Vocational and Technical Education. The results and conclusions reported relate to student achievement and teacher evaluation and comments for each of the 23 units of the manual. In general, the evaluation and comments were favorable. The total for all schools indicates that on only six of the 23 units that were analyzed did students fail to reach the arbitrarily set 80 percent success level. This analysis is useful in the total evaluation of the curriculum manual as a whole; however, it fails to take into account the concepts being learned--how important they were in relation to the performance, and how difficult they were to grasp. The major conclusion of the research unit is that the curriculum meets the needs of most of the instructors. It is recommended that future studies be done in regard to student achievement as related to performance skills. (Because of the lack of response concerning the use of many of the job sheets and assignment sheets in the manual, no conclusions can be drawn from the students' achievement on the cognitive tests to determine their ability to perform the skills themselves.) (KC)

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VALIDATION OF AUTO MECHANICS I CURRICULUM MANUAL

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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June 1981
Research Coordinating Unit
State Department of Vocational and Technical Education
1515 West Sixth Avenue, Stillwater, Oklahoma 74074

CE 029 344

FUNDING INFORMATION

Project Title:	Validation of Auto Mechanics I Curriculum Manual
Project Director:	Sheila D. Stone
Source of Project:	This is an in-house project of the Oklahoma Vocational Research Coordinating Unit, Oklahoma State Department of Vocational and Technical Education
Source of Funds:	Vocational Education Amendments of 1976, Public Law 94-482, Section 131(a) and State appropriations for vocational education
Project Number:	OK801311005
Disclaimer:	This publication was prepared pursuant to an approved in-house project of the Oklahoma Vocational Research Coordinating Unit. Project directors undertaking research and development projects under such sponsorship are encouraged to freely express their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Oklahoma State Department of Vocational and Technical Education position or policy.

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ABSTRACT

This report is the result of a field test of Auto Mechanics I curriculum materials developed and published by the Curriculum and Instructional Materials Center, Oklahoma State Department of Vocational and Technical Education. The results and conclusions reported herein relate to student achievement and teacher evaluation and comments for each unit of the manual.

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INTRODUCTION

The Curriculum and Instructional Materials Center (CIMC) at the Oklahoma State Department of Vocational and Technical Education is recognized nationwide as one of the leaders in curriculum development. The CIMC has developed a large number of curriculum manuals in the past decade. These manuals have been standardized in format and are used by curriculum centers and instructors throughout the United States and in several countries.

Because teachers need to have immediate access to good curriculum materials, the CIMC developmental processes have not included a field test of materials before they are released for sale to the schools. Advisory committees composed of vocational teachers, representatives from business and industry, teacher-educators, the curriculum specialist/writer, and state and district supervisors knowledgeable in the particular occupational areas are used extensively throughout the developmental cycle to ensure the validity of the content. Past experience and feedback from teachers have given validity to the format and to the usability of the materials by both students and teachers.

This is one of a series of studies conducted to determine validity in terms of student ability to attain the performance-based objectives of the curriculum. The purpose of this study was to validate the Oklahoma CIMC's Auto Mechanics I curriculum manual.

DESIGN AND METHODOLOGY

Names of the Oklahoma auto mechanics instructors were obtained from the Trade and Industrial Education Division of the Oklahoma State Department of Vocational and Technical Education. Letters were sent to the instructors requesting that they indicate which units of the Auto Mechanics I manual they planned to teach during the 1979-80 school year and the approximate dates the units would be taught. A copy of the table of contents was enclosed for their convenience in checking the units. Responses were tabulated to identify those units which would be taught early in the school year.

Of the twenty-five respondents who were telephoned to ascertain if they would participate in the field test, twenty-four agreed to help. A letter was then sent to each instructor explaining the field test procedures and listing the units that particular instructor had been assigned to field test. The instructors were also encouraged to send other unit tests if desired.

Each instructor collected the student achievement data in the following manner. The performance-based test which accompanied each unit in the manual was administered by the instructor to each student upon completion of the unit. The tests were graded item by item; i.e., the teacher indicated on the student's test whether each test item was answered correctly or incorrectly. The instructor was free to add or delete test items, weight the items for a total score, or use any other procedures normally used in testing. However, the Research Unit considered only the items on the unit tests. The student's performance on each of the assignment sheets and job sheets was also to be recorded on the unit test. The instructors were asked to send in selected assignment sheets for which performance could be measured; e.g., one assignment sheet could be used to measure the student's ability to correctly read plain micrometer settings.

Evaluation forms were provided so that the instructors could comment on the various components of the unit and on changes that needed to be made. Criticisms and suggestions were encouraged. Copies of the correspondence and unit evaluation forms are included in the appendix.

As each unit was completed, the teacher submitted the unit tests, assignment sheets (if applicable), and evaluation form to the Research Unit. Data were keypunched and the tests and assignment sheets were returned to the teacher. Item analyses were made on the tests and assignment sheets. These analyses included frequency counts of the number of correct answers and the percentage of students having a correct answer on a given item. The results were used to help identify

those items which the students had difficulty achieving. Table 1 lists the final data collection results and indicates the number of students enrolled in auto mechanics at each school.

TABLE 1

PARTICIPANTS IN THE STUDY

School Number	Number of Students	Number of Units Submitted
4	29	3
5	24	5
7	62	3
8	21	6
12	32	5
13	18	7
14	26	13
15	30	5
16	16	3
17	17	6
18	26	5
19	22	3
20	26	4
22	10	4
25	24	1

UNIT TEST RESULTS

Each unit will be discussed in terms of student achievement. Teachers' comments will be presented at the end of this section. The unit tests and assignment sheets are broken down item by item in the appendix to show the percentage of correct responses. Forms showing student achievement on each item by school are available from the Oklahoma Research Unit.

It was determined arbitrarily that 80 percent of the students should answer the items correctly to demonstrate acceptable achievement of the concept being measured. Those concepts which students had the most difficulty achieving will be examined in the discussion of each unit. It is beyond the scope of the study to identify the reasons why students fail to achieve on a given concept.

Orientation

This unit ranked second in overall achievement with 94.4 percent. None of the items fell below 92.0 percent. Since most of the analysis is based on responses from one school, it could be unique to the situation. There was no response about the use of the assignment sheet.

Safety

The highest overall achievement (96.3 percent) was obtained on this unit. Because this unit is based on safety, the preferred level should be set at a higher level. The only test question which fell below the 80 percent standard asked the students to match the types of fire extinguishers to the class or classes of fires each was best suited to extinguish. The students were told that there might be more than one answer per item. The three items that were missed most often overall were the ones that required more than one answer. These were counted incorrect if one or more of the answers were not marked; no partial credit was given. There was no response from two schools concerning the assignment sheets; students at a third school did not have access to the assignment sheets.

Hand Tools

Overall achievement was 79.7 percent. The most difficult question was the identification of drive line tools, with responses ranging from 39.5 to 68.6 percent. Other tools which caused students at three or more of the schools to fall below the 80 percent level were tube flaring tool, straightening cone, dial indicator set, pipe expanding tool, belt tension gauge, radiator pressure tester, hose clamp pliers, grease

fitting tool, brake shoe adjusting gauge, disc brake pad spreader, spring pliers, and cylinder clamp.

One instructor did not ask his students to identify front-end service tools. Less than two-thirds of the students at two schools knew the names of the tools. The tie-rod end removing tool and toe-in adjusting wrench were not identified correctly at three of the schools. All four schools fell below the 80 percent level in the identification of a ridge reamer, cylinder taper gauge, and valve spring pressure tester. Identifying types of punches seemed to confuse the students, perhaps because the illustrations looked similar in detail. The triple square cap socket was also confusing to the students. Only 46.5 percent could write the purpose of hand tools. There were approximately 146 tools to identify in this unit. Most of the low achievement was centered around tools used to service the exhaust system, charging system, starter system, cooling system, brakes, front end, engine, and drive line. Types of basic tools such as hammers, files, chisels, and wrenches did not pose a problem. Perhaps the more specialized tools should be presented in the units where they will be used rather than all lumped into one unit. None of the instructors specified to what extent the job sheets were used.

Arc Welding

One instructor sent in this unit. The overall achievement at that school was 87.2 percent. This same instructor was the only one who sent in any of the welding units. Although he had a large class, the analysis will still be somewhat biased. Bead weld and pass were the two terms which were missed most frequently. Forty percent of the students incorrectly selected 5/16" as a common size for an electrode. Barely fifty percent could identify what the last three digits on an electrode mean according to the electrode classification system. Sixty-four percent correctly selected "to increase speed" and "shield molten puddle from air" as purposes of electrode coating. Sixty-eight percent of the students could list only three of the four factors to consider in selecting electrodes. Only 56 percent could label penetration when given a drawing of the welding process. Only 70 percent could identify fillet and groove welds. There was no response in regard to the job sheets.

Oxyacetylene Cutting

Overall achievement was 84.3 percent. Identifying the oxygen and acetylene pressure regulating screws, regulators, and cylinder valves posed problems for some of the students because they switched the oxygen with the acetylene. They also confused the acetylene fitting and torch valve with the oxygen fitting and torch valve. The same confusion occurred when the students identified the oxygen and acetylene torch valves and fittings when labeling parts of the torch body and cutting attachments. Only 60 percent of the students could label the preheat orifice and cutting orifice. Seventy-five percent could list a sixth rule for the safe handling of oxygen and acetylene equipment. This would be better suited as a select-from-a-list question.

Only 70.8 percent could describe what happens when a backfire occurs and 75 percent could describe what happens when a flashback occurs. It is not known whether the other students did not know the answer or were unable to put their thoughts on paper. Releasing the oxygen regulator screw was the only step out of the eight steps that should be followed in case of a flashback that was listed correctly by 80 percent of the students. If these steps must be followed in sequence in order to prevent injury, then obviously the students must learn the correct procedure. There was no response concerning the job sheets.

Oxyacetylene Fusion Welding

The overall achievement rate was 88.6 percent. Only 28 percent of the students could identify an oxidizing flame and a mere 32 percent could identify a neutral flame. The responses for the same question in the oxyacetylene cutting unit were in the 90 percent range. The only difference in the two test questions is the illustrations themselves. In this unit, the flames are shown as emitted from welding tips. In the oxyacetylene cutting unit, they are shown coming from a cutting attachment and tip. The flames are drawn slightly more distinctively in the cutting unit. Sixty-eight percent of the students could list one factor that determines the type of filler rod to use in oxyacetylene welding; 52 percent could list two factors. Seventy-six percent knew that movement of the tip determined weld quality; over 80 percent of the students correctly selected the other determining factors. There was no response on the job sheet objectives.

Oxyacetylene Braze Welding

Overall achievement was 85.2 percent. A range of 96.2 to 30.8 percent occurred when students listed five purposes for using flux. Achievement fell in relation to the number of purposes the students attempted to list. The students could successfully list two advantages and two disadvantages of braze welding, but could not list a third advantage and disadvantage. All of the students at the school could satisfactorily braze weld a square groove butt joint.

Rules

This unit ranked lowest in overall achievement with 62.1 percent correct responses. Only one-third of the students could list any one of the four steps in reading a rule. Responses ranged from 14.9 to 53.2 percent when the students listed eight procedures for using rules. One class had difficulty identifying types of rules and writing the uses of specific rules with accessories. Another class had problems identifying the hook rule and writing the uses of the level protractor, key seat measurement, and outside caliper. Students at both schools had trouble listing a fourth metric unit found on rules. Since neither instructor submitted the assignment sheets, it is unknown whether the students are capable of applying the measuring skills even though they did not perform well on the cognitive test.

Outside Micrometer

The achievement on this unit barely exceeded the 80 percent level. Only 62.6 percent of the students could discuss methods for checking the accuracy of the 0"-1.000" micrometer. A mere 47.7 percent could discuss methods for checking the accuracy of micrometers larger than one inch. The students also had difficulty listing more than three rules for the use and care of micrometers. Three-fourths of the students could list one step in selecting the proper size of outside micrometer; but less than two-thirds could list a second. Only two-thirds of the students could read a vernier micrometer setting as shown in a drawing.

Approximately 92 percent of the students in one class and all of the students in another school could satisfactorily use a plain micrometer. Only three-fourths of the students at one school could use a vernier micrometer. One instructor did not have access to vernier micrometers so did not use that job sheet. There was no response from a third school concerning the use of either job sheet. The lowest achievement obtained when the students read the plain micrometer settings on Assignment Sheet #1 was 94.4 percent. The vernier micrometer settings on the second assignment sheet were a little more difficult, but the only item that fell below the 80 percent level was the last one. This setting was the only one that had a 0.000 reading on the vernier scale on top of the sleeve. This might have caused the confusion, or the students might have read the graduations on the thimble as 0.0050 rather than 0.0020.

The Inside Micrometer

Slightly over 82 percent was achieved overall on this unit. None of the schools had at least 80 percent of the students who could list more than five rules for use and care of micrometers. Students at two of the schools could not satisfactorily list three methods for checking the accuracy of an inside micrometer. These same two classes had trouble identifying all of the accessories used with an inside micrometer except the extension rod. One-third of the students overall could not identify the base unit. Less than two-thirds could list a fourth use of the inside micrometer. Students at one school used the inside micrometer to the instructor's satisfaction; the job sheet was not used at another school. A third instructor did not respond about the use of the job sheet in the classroom.

Only one item on the assignment sheet fell below the 80 percent level. The students incorrectly read one setting as 0.028. There are two small graduations supposedly showing on the sleeve rather than one; however, the illustration does not show this clearly and therefore needs to be redrawn.

Basic Engine Principles

The overall achievement was 82.5 percent. The majority of test questions that fell below the 80 percent level were discussion-type questions or calculations. One instructor did require his students to answer eleven

of the questions. Ten of the terms were below the set standard overall; nine of these terms were low at two of the schools. The term volume caused low achievement at all three of the schools. Half of the students could discuss characteristics of energy and characteristics of heat engines. Listing three uses of simple machines was completed satisfactorily by half of the students at two schools and was not used at a third school. Calculating problems using various formulas created confusion at the two schools using the questions--73.7 percent could calculate torque, 33.3 percent could calculate horsepower, and 77.2 percent could calculate the formula for work. Less than one-third of the students could explain the results of increasing the compression ratio. Discussion-type questions 14, 15, 16, 17, 18, 19, and 22 ranged from 32.1 to 56.8 percent in correct responses. It would have been interesting to note if the students could have given the correct answers orally. If their writing skills were poor then the unit test as is would not be a valid indicator of their knowledge. The students had very little trouble identifying the components of an automobile engine.

Cooling System

Overall achievement was 87.2 percent. Less than three-fourths of the students could list two jobs that the cooling system must perform; only one-half could list a third job. Students at four schools had trouble describing the liquid method of cooling the internal combustion engine; five of the classes had trouble describing the air method. The students overall could describe the pressure cap operation when the cooling system was very hot with built-up excess pressure, but ran into problems when they described pressure cap operation during the cooling-off period and at normal temperature. Two-thirds of the students could describe the operation of the variable-speed fan drive. Five classes had problems describing the operation of a coolant recovery system.

Two of the classes performed the job sheets satisfactorily--some as a group, some individually. Two instructors did not use the job sheets. Students at another school removed, checked, and replaced thermostats and removed and replaced water pumps satisfactorily; there was no response concerning the use of the other performance skills. There was no response on any of the job sheets from a sixth school. In this unit, there did not appear to be a relationship between use of the job sheets and achievement on the test.

Engine Lubrication System

Overall achievement was 78.5 percent. Barely half of the students could list a fifth purpose of the engine lubrication system. Only 65.8 percent could identify a sealed cartridge filter; 70.2 percent could identify a replaceable element type. Less than two-thirds of the students could name one method of classifying engine oil; one-third could name a second method. More than 50 percent of the students were unable to discuss oil viscosity classifications. Two classes had trouble matching letter designations to the correct description of the type of oil it represents. Three of the schools obtained low achievement when listing four points to consider when selecting engine oil and

eight additives found in engine oil. One instructor did not require his students to list the additives. Two classes completed the job sheets satisfactorily; two instructors did not respond; and one class did not use them.

Exhaust System

Overall achievement was 85.1 percent. The most difficult question asked the students to identify the basic components of the exhaust gas recirculation system. One instructor did not use the question, but the rest of the schools ranged from 35.0 to 64.2 percent correct answers. The illustration might not have been clear enough or perhaps there were not enough reference points or enough detail for the students to determine what the components were. Less than one-half of the students in all six of the schools could describe the construction and operation of a catalytic converter. Discussing the causes of internal and external corrosion of the exhaust system caused low achievement in four of the schools.

Two instructors did not assign the job sheets, and another instructor did not comment as to whether they were used. One class performed the job skills as a group; another class performed them individually to the instructor's satisfaction. At a sixth school, the students completed all of the job sheets except removing and replacing a catalytic converter and its heat shields.

Fuel System

Overall achievement was 83.1 percent. Three-fourths of the students could define atomization, venturi, or metering. Less than two-thirds of the students could describe the fuel pump operation during the inlet and outlet strokes. The students encountered difficulty when they tried to identify the nozzle and throttle body on a carburetor. One class was not tested on questions 9, 10, or 11.

Students at a second school were confused by antioxident and deposit modifier additives and carburetor detergent when matching types of additives to their correct purposes. Only 22.2 percent of the students could discuss fuel injections and less than one-half of the students could list more than three variations of fuel injection systems. However, these same students were able to perform the job skills to the satisfaction of their instructor. There was no response from a second school concerning the job sheets.

Wheel Bearings

Overall achievement was 87.9 percent. Bearing cone was the only term that fell below the 80 percent achievement. There was no response from one school concerning use of the job sheets; however, the other students performed them satisfactorily. Even though the students were unable to write their answers correctly they were able to perform the skills.

Tires and Wheels

This unit fell slightly below the 80 percent standard with 79.9 percent because of achievement at two schools. Only one item fell below 80 percent at all three of the participating schools. Barely one-third of the students could discuss tire inflation pressure. The open-endedness of the question may have accounted for the poor response rate. Students at two of the schools had trouble identifying the rubber chafer, fillers, and casing plies on a cut-away drawing of a tire. The confusion probably resulted from the ambiguity of the illustration. It is somewhat difficult to distinguish between the three different parts as shown on the test. Less than 46 percent of the students at two of the schools could describe the way radial, bias, and belted-ply tires are laid. These same students could only partially complete a chart by stating the cord type when given tensile strength in psi and advantages. They had some difficulty in identifying tire tread wear patterns caused by toe-in and camber wear. They were also confused by the tire size markings, especially the aspect ratio and size range as shown in the late marking system.

Less than 70 percent of the students could list three reasons for periodic tire rotation nor could they draw tire rotation patterns for bias and radial ply tires. Two of the classes also had difficulty in identifying the center section, flange, drop center area, and safety flange on an illustration of a drop center wheel. The job sheets were not used at one school; there was no response at another. The instructors felt that this was too detailed a unit for school shops and that the unit should deal with only the very basic knowledge. This opinion of the teachers may have affected their teaching methods and thus carried over to the students the lack of importance the instructors held about many of the concepts in this unit.

Wheel Balancing

Overall achievement was 92.9 percent. Achievement of less than 80 percent occurred at only one school. This was based on the listing questions and one of the discussion questions. Only two-thirds of the class could discuss static and dynamic balance. They had little trouble listing three advantages of balancing wheels or four conditions which would require rebalancing of the wheel, but could not name two more for either question. There was no response from any of the schools concerning use of the job sheets.

Suspension System

Overall achievement was 73.0 percent. Only one-third of the students could discuss the four types of suspension springs--semielliptical leaf spring, coil spring, torsion bar, and air spring. Overall achievement ranged from 45.6 to 63.2 percent when the students attempted to define the terms associated with the suspension system. Less than two-thirds could state the purpose of the suspension system. They also had trouble identifying the independent front suspension system or S.L.A. control arm arrangement and the independent rear suspension system with swing axle. Students at two of the schools had difficulty identifying the

hangar assembly and the shackle system. Eighty-three percent of the students who attempted the job skills performed them satisfactorily; the others were to complete them later in the year. There was no response from two other instructors about the use of the job sheets in their schools.

Steering System

Overall achievement was 81.0 percent. The most difficult question asked the students to describe the three types of power steering systems. Only one-half of the students could answer the question correctly. The only term that was answered incorrectly at all four schools was variable ratio power steering. The students also had trouble listing three types of manual steering gears. Three classes were unable to satisfactorily identify the steering shaft bearing adjuster on an illustration. The part that the arrow is pointing to is not clearly defined in the drawing. Most of the other items which fell below the 80 percent standard resulted from low achievement at only one or two of the participating schools. There was no response on the performance objectives for three of the schools. Some of the students at a fourth school satisfactorily inspected a steering system for damaged parts or wear and removed and replaced a tie rod end; the remaining students were to complete the two job sheets at a later time. The students were not required to remove, recondition, and replace a recirculating ball type steering gear. The instructor did not respond about the other two job sheets.

Wheel Alignment

Overall achievement was 82.8 percent. Less than two-thirds of the students could write the purpose of wheel alignment. In one school the students had very little trouble matching wheel alignment angles to the correct definitions but could not match these same angles to their purposes. One school did not have higher than 75 percent achievement on any of the test items. There was no response concerning use of the job sheets at three schools. Of the students at a fourth school who attempted the job sheets, only two-thirds of them completed them satisfactorily. The other students were to complete them later in the year.

Brake System

Overall achievement was 84.8 percent. Less than 50 percent of the students could describe the brake operation as the brake pedal is depressed and as it is released. Less than two-thirds of the students could identify the early and late types of cable pulls, and only three-fourths could identify the lever type. (One instructor did not use the test question.) Seven of the ten parts of the standard brake assembly caused problems in three of the schools. In a couple of instances it was not clear what part was to be identified because of the placement of the arrows. The pressure differential valve and brake warning lightswitch caused problems in three of the schools when the students were asked to identify components of the tandem or dual brake system.

Identification of isolated parts on a two-dimensional surface may cause lower achievement than identification of the same parts on an actual car or section of a car.

There was no response from two instructors concerning use of the job sheets. Students at another school completed them satisfactorily. Of the students attempting the job sheets at a fourth school, 76.9 percent could bleed the hydraulic system and remove, inspect, and replace brake drums. Only 70 percent of them could adjust brake drums and 80 percent could remove and replace brake shoes. These job sheets were to be done later by the other students in the class. The master cylinder and wheel cylinder skills were also to be completed later by the entire class. At a fifth school, all but two of the students completed the first five job sheets to the instructor's satisfaction; the two students were to complete all of the job sheets at a later date. Seventy-five percent of the students at the fifth school could remove, recondition, and replace a master cylinder but only 25 percent could remove, recondition, and replace a tandem master cylinder. These students obtained low achievement on the test when identifying the parts of the standard master cylinder and the tandem master cylinder.

Power Disc Brakes

This unit ranked next to last in overall achievement with 71.2 percent. Only one school out of five had higher than the 80 percent standard Only 27.5 percent of the students could discuss the operation of the vacuum suspended power booster, the atmospheric suspended power booster, and the hydro-boost power booster. Four out of five classes were confused by the definition of metering valve. These same classes had trouble identifying the caliper adapter on a floating caliper disc brake.

Starting with test question six, achievement dropped below the 80 percent standard on every item but one. This was true not only for the discussion and list questions, which usually have lower scores, but also for the identification questions. One instructor did recommend that the information relating to the vacuum operated power booster be deleted. It might be that most of the instructors concentrated on the basic disc brake information and did not stress power boosters or more specialized information. A range of 36.7 to 44.0 percent was obtained when the students discussed conditions that are considered normal and are not indications that a master cylinder needs service. Knowledge of these conditions would help the mechanic save customers needless repair bills and would save shop repair time. It was unknown whether the students were unable to write their thoughts down or if they did not know the answers.

There was no response from two instructors on the job sheets. One class was to perform the skills later in the year. The students at a fourth school tested the hydraulic system and repaired a sliding caliper disc brake to the satisfaction of their instructor. They performed the two other job sheets as a group. Ninety-two percent of the students at a fifth school could satisfactorily test the hydraulics system, repair

a sliding caliper disc brake, and check disc runout and thickness; however, only 62 percent could test the vacuum operated power booster.

Summary of Overall Achievement

Table 2 displays the percentages of correct answers on the unit tests by unit, by school, and by total across schools. The total for all schools indicates that on six of the twenty-three units that were analyzed, students failed to reach the arbitrarily set 80 percent level. This analysis is useful in the total evaluation of the curriculum manual as a whole; however, it fails to take into account the concepts being learned--how important they were in relation to the performance, how difficult they were to grasp.

TABLE 2
PERCENT CORRECT BY UNIT BY SCHOOL

Unit	All Schools	School 4	School 5	School 7	School 8	School 12	School 13	School 14
I-A	94.4	-	-	-	[illegible]A	-	-	94.1
II-A	96.3	-	-	-	99.[illegible]	-	-	93.3
III-A	79.7*	-	-	-	81.0	87.9	-	-
IV-A	87.2	-	-	-	-	-	-	-
V-A	84.3	-	-	-	-	-	-	-
VI-A	88.6	-	-	-	-	-	-	-
VII-A	85.2	-	-	-	-	-	-	-
I-B	62.1*	-	-	57.1*	-	71.9*	-	-
II-B	80.3	-	-	74.7*	-	88.6	85.7	-
III-B	82.2	-	-	79.4*	-	88.5	80.3	-
I-C	82.5	-	-	-	-	81.4	-	-
II-C	87.2	93.0	-	-	83.6	-	86.0	79.2*
III-C	78.5*	81.8	-	-	97.8	-	-	77.1*
IV-C	85.1	85.1	-	-	-	-	84.7	82.6
V-C	83.1	-	-	-	-	-	83.0	83.2
I-D	87.9	-	89.6	-	-	-	-	82.6
II-D	79.9*	-	-	-	-	-	-	97.1
III-D	92.9	-	98.2	-	-	-	-	-
IV-D	73.0*	-	81.8	-	-	-	-	80.0
V-D	81.0	-	89.1	-	-	-	-	81.1
VI-D	82.8	-	94.9	-	-	-	-	95.1
I-E	84.8	-	-	-	96.4	-	80.1	87.9
II-E	71.2*	-	-	-	-	-	75.1*	68.5*

Table 2 Percent Correct by Unit by School (Continued)

Unit	All Schools	School 4	School 5	School 7	School 8	School 12	School 13	School 14
I-A	94.4	-	-	-	-	-	-	-
II-A	96.3	-	97.0	-	-	-	-	-
III-A	79.7*	-	88.0	-	-	-	-	64.2*
IV-A	87.2	-	-	-	87.2	-	-	-
V-A	84.3	-	-	-	84.3	-	-	-
VI-A	88.6	-	-	-	88.6	-	-	-
VII-A	85.2	-	-	-	85.2	-	-	-
I-B	62.5*	-	-	-	-	-	-	-
II-B	80.3	-	-	-	-	-	-	-
III-B	82.2	-	-	-	-	-	-	-
I-C	82.5	87.7	-	-	-	-	76.8*	-	-
II-C	87.2	-	91.2	-	-	-	87.3	-	-
III-C	78.5*	80.1	-	-	-	-	63.7*	-	-
IV-C	85.1	90.1	-	-	86.4	-	81.1	-	-
V-C	83.1	-	-	-	-	-	-	-	-
I-D	87.9	-	-	-	-	-	-	97.7	-
II-D	79.9*	-	-	63.3*	-	72.5*	-	-	-
III-D	92.9	-	-	-	-	85.2	-	98.3	-
IV-D	73.0*	-	-	54.7*	-	-	-	-	-
V-D	81.0	-	-	60.5*	-	-	-	95.9	-
VI-D	82.8	-	-	44.1*	-	-	-	88.8	-
I-E	84.8	93.0	-	63.9*	-	-	-	-	-
II-E	71.2*	93.4	-	41.6*	-	64.9*	-	-	-

TEACHER COMMENTS

The participating instructors were sent evaluation forms asking for their opinions on the different components in each unit they field tested. Their comments are listed below. A number in parentheses following the statement indicates the number of teachers who made that comment. A copy of the evaluation instrument is included in the appendix.

Safety

Effective in helping students to learn.
I did not have assignment sheets.
Unit was thought-provoking.
Objectives page should give reason for knowing tools.
Pictures on information sheets would be useful.
Transparencies were good study tools.
Test and answers were easy for teacher to give and grade.
This is a very good unit.

Hand Tools

Didn't use transparencies.
A few items should be eliminated; such as electric pipe joint heater.
Didn't use job sheets.
Effective in helping students to learn. (2)
I suggest you make a list of the needed beginning tools an apprentice mechanic should own.
Used job sheets in part.

Arc Welding

Effective in helping students to learn.
Answers were easy for teacher to use.

Oxyacetylene Cutting

Effective in helping students to learn.
Answers were easy for teachers to use.
No suggested changes.

Oxyacetylene Fusion Welding

Effective in helping students to learn.
Objectives page was motivating.
Suggested activities, job sheets, test, and answers were easy to use.

A very good unit of instruction for auto mechanics; meets program objectives.

Oxyacetylene Braze Welding

Objectives page was motivating.
Effective in helping students to learn.
Easy for teacher to use.
Very good materials; meets the needs and objectives of the auto mechanics course.

Rules

Effective in helping students to learn.
Didn't use suggested activities, transparencies, or assignment sheets.
Unmotivating.
Seemed to have a lot of unusable materials.

The Outside Micrometer

Used unit in part. (2)
Effective in helping students to learn.
Excellent transparencies.
We do not have vernier micrometer.
Unit is complete.
Is the best available material.
Current information.
Have adequate or abundant resources.
Parts of the unit are incomplete.
Well-sequenced.
Thought-provoking.
Motivating.
Needed for successful employment.
Unbiased.
Easy for teacher to use.
Confident of technical knowledge myself.
I don't believe there is a need for the vernier micrometer information.

The Inside Micrometer

Used job sheet in part.
Easy for teacher to use.
Didn't use suggested activities or job sheet.
Effective in helping students to learn.
Facilities and equipment readily available or unnecessary.
Have adequate or abundant resources.
Complete.
Well-sequenced.
Thought-provoking.
Motivating.
Needed for succesful employment.
Unbiased.

Easy for teacher to use.
Incomplete.
Confident of technical knowledge myself.

Basic Engine Principles

Too much math.
Didn't use suggested activities. (2)
The example under compression ratio in terms and definitions should be cylinder volume at BDC not TDC.
Effective in helping students to learn.
Suggested activities are written in logical order.
Transparencies are easy for teacher to use.

Cooling System

Didn't use suggested activities or job sheets.
Used suggested activities and job sheets in part; confident of technical knowledge myself.
Question one, the purpose of the cooling system, is often overlooked by students.
Unit is good.
Probably can remove bellows type thermostat from material as it is not used anymore.
Effective in helping students to learn. (2)
Facilities and equipment are readily available.
Is the best available material.
Have adequate resources.
Incomplete.
Well-sequenced.
Thought-provoking.
Needed for successful employment.
Unbiased.
Easy for teacher to use.
Confident of technical knowledge myself.
Used suggested activities in part.
Job sheets are too elementary; used them in part.

Engine Lubrication System

Didn't use suggested activities page or job sheets.
Effective in helping students to learn. (2)
Suggested activities and transparencies were easy for teacher to use.
Students completed all jobs on job sheets.
Job sheets were written in logical order.
Question 10 might be shorter.
Good unit.
Easy for teacher to use.
Students have enough homework in other courses.
Didn't use question 10 on test.

Exhaust System

Effective in helping students to learn. (3)
Easy for teacher to use. (3)
Students completed all jobs on job sheets except removing and replacing a catalytic converter and heat shields.
Information sheets were well-sequenced. (2)
Question 7 should probably be a describe type question.
Question 10 is difficult to determine where the arrows are pointing. Drawing should be larger.
Didn't use suggested activities or job sheets.
Objectives page is well-written. Students know what they must do.
Lack of equipment to use suggested activities.
Logically written.
Transparencies are very effective teaching aids.
Lack of equipment prevents use of job sheets.
Test is well written and is a very effective measurement of students' knowledge.
Test is thought-provoking.
Answers to test are easy for teachers to use.
At the present time the curriculum is adequate and very useful in helping student to learn.
Facilities and equipment are readily available.
Is the best available material.
Have adequate resources.
Incomplete.
Well-sequenced.
Thought-provoking.
Motivating.
Needed for successful employment.
Unbiased.
Confident of technical knowledge myself.
Needs some updating on component parts.

Fuel System

Information sheets, transparencies, job sheets, and test are effective in helping students to learn.
Well-sequenced.
Complete.
Easy for teacher to use.
Information sheets, transparencies, and job sheets are thought-provoking.
Along with the unit of instruction, I used the following filmstrips: Bergwall Productions Inc.'s "Carburetor Circuits"; Ford Motor Co.'s "Fuel System Principles"; and Jim Handy's "The Fuel System."
Four or five students pulled the overall score down on the test. At the present I don't see any need for changes. However, in a couple of years or so there will probably be some major changes that will cause a need for some updating of the fuel system.

Wheel Bearings

Effective in helping students to learn.
Suggested activities, assignment sheets, and job sheets are complete.
Used transparencies.
Transparency 10 is good for basic use along with film.
Used all three ways to pack bearings.
Job sheets are needed for successful employment.
Job sheets help student start course with ease.
Test and answers are easy to use.
I see no need for changes.

Tires and Wheels

Used suggested activities in part.
This unit, as far as the construction of tires and wheels, is too extensive if it is to be used to teach a person to enter the trade at a job entry level. More time should be spent developing a better wheel alignment section where the theory helps develop the skill needed.
Effective in helping students to learn.
Facilities and equipment readily available.
Too advanced for student.
Have adequate or abundant resources.
Complete.
Current/up-to-date.
Written in logical order.
Unmotivating.
Unnecessary for successful employment in part.
Unbiased.
Easy for teacher to use.
Confident of technical knowledge myself.
Used objectives page and suggested activities as a guide.
Used job sheets in part; equipment was not available.
The demonstration is not needed; most school shops do not repair tires because the equipment is not available.
I think this unit should pertain to tire structure, purpose of tires, functions, and types of tires.

Wheel Balancing

Used suggested activities and job sheets in part.
Effective in helping students to learn. (3)
Facilities and equipment readily available.
Have adequate or abundant resources.
Current/up-to-date.
Written in logical order.
Needed for successful employment.
Easy for teacher to use.
Confident of technical knowledge myself.
Job sheets were up-to-date and needed for successful employment. (2)
Test was complete.
Test and answers were easy for teacher to use.

Suspension System

Effective in helping students to learn.
Information sheets and job sheets were written in logical order.
Information sheets, transparencies, and answers to test were easy for teacher to use.
For first-year students, the units should be more for learning parts of components and their usage with less explanation.
This unit may lower their grade averages.

Steering System

Used suggested activities in part.
Information sheets and transparencies are incomplete.
Inspection of worn parts can be done.
No special tool to work on steering gears.
Assignment sheets could help. When assignment sheets are in the unit, I use them.

Wheel Alignment

Effective in helping students to learn. (2)
Used suggested activities in part.
Working towards each student aligning autos.
Information sheets are needed for successful employment.
Transparencies are complete. (2)
Transparencies and job sheets are easy to use. (2)
Job sheets are good for use and for information.
No other books or worksheets contain this amount of information.
Job sheets are current.
Test is easy for instructor to use.
Job sheets are needed for successful employment.
I also add other information that is available; line products.
I use job sheets as assignment sheets, which works very well.

Brake System

Effective in helping students to learn. (3)
Answers to test are easy for teacher to use. (2)
Objectives page, transparencies, and test are easy for teacher to use. (2)
We go over tests in class.
Information sheets, transparencies, and job sheets are needed for successful employment. (2)
Information sheets were well-sequenced.
The test for this unit is very good for identification purposes, especially for first-year students.
The information was well put together.
Unit is the best available material.
Current/up-to-date.
Complete.
Well-sequenced.
Thought-provoking.
Motivating.

Have adequate resources for suggested activities.
Pictures need to be "blown-up" or "distinguished" for better identification on test questions 3 and 4.

Power Disc Brakes

Effective in helping students to learn. (2)
Easy for teacher to use. (3)
Transparencies were motivating.
Written in logical order. (2)
Information sheets were current.
Information sheets and job sheets were needed for successful employment. (2)
Confident of technical knowledge myself. (2)
Test should be in two parts. The students complained that the test was too long.
I would suggest taking out the information on vacuum units.
Is the best available material.
Complete.
Thought-provoking.
Motivating.
Up-to-date.

General Comments

Most units provide excellent "basic" theory and job techniques.
The task sheets are as accurate as any published materials I have encountered, and the few exceptions are hardly worth mentioning.
I burn many transparencies of the "blue" sheets to incorporate special emphasis on service procedures during theory time.
The rapidly changing technology of our industry makes many of the units obsolete almost by the time we teach them.

CONCLUSIONS

This study was designed specifically to identify those concepts on which 20 percent or more of the students were not achieving. This standard was arbitrarily set by the Research Unit. Furthermore, the students' knowledge as related to auto mechanics was measured solely by their ability to respond correctly to the test items in the curriculum manual.

On any given test item where less than 80 percent of the students responded correctly, we assume there is a problem. The concept itself may be so difficult to grasp that only the more advanced students should be expected to learn it. Unclear information or inadequate assignment sheets and job sheets tend to confuse the students and therefore restrict their understanding of the material. The test questions themselves may be poorly written. For example, student response was lower on the list type questions because several answers were required. The discussion questions proved difficult because the questions were marked incorrect if any portion of the student's answer was wrong.

When only one or two schools have less than 80 percent of the students passing an item, the problem may be unique to that situation. The curriculum materials themselves may provide an adequate base for teaching the concept but are not being properly used by the instructor. Curriculum utilization workshops might provide motivation for those instructors who are unfamiliar with the curriculum format. Teachers may not be as knowledgeable in some areas as they are in others and therefore may have difficulty presenting some topics. No effort was made in this study to ascertain if there was a relationship between the auto mechanics instructors' areas of expertise and student achievement or between the instructors' participation in a curriculum workshop and student achievement.

The welding units in Auto Mechanics I are similar to ones in the Welding curriculum. Overall, the auto mechanics students achieved higher on the units than the welding students. Some of the original questions had been changed to select-from-a-list and matching questions which may have prompted higher scores. Obviously, the emphasis that the auto mechanics instructors place on these particular welding units will vary from the welding instructors. In some instances, welding instructors were used as resource persons to teach the welding skills. It is not known whether these particular auto mechanics teachers did not feel comfortable teaching the welding concepts or whether they lacked adequate facilities and equipment in their school shops and therefore had to utilize the welding facilities.

The major conclusion of the Research Unit is that Auto Mechanics I meets the needs of most of the instructors. Achievement fell below eighty percent on six of the twenty-three units. However, the two units which should be studied further by the Curriculum and Instructional Materials Center are "Rules" and "Power Disc Brakes." Many of the questions that were missed dealt with calculations and reading rules. Identification of various tools and auto parts perplexed the students, but it is unknown whether the students were unfamiliar with the more specialized skills due to teacher preference or whether they were actually unable to perform them adequately. It is recommended that future studies be done in regard to student achievement as related to performance skills. Because of the lack of response concerning the use of many of the job sheets and assignment sheets in the manual, no conclusions can be drawn from the students' achievement on the cognitive tests to determine their ability to perform the skills themselves.

APPENDICES

STUDENT ACHIEVEMENT

This section contains a list of the percentage of correct answers attained by the students overall on each item on the unit tests from the Auto Mechanics I curriculum manual. An asterisk indicates those percents below 80, which were considered by the Research Unit to be less than satisfactory achievement.

The assignment sheets are designated by the letters A.S. Job sheets are designated by the letters J.S. An n.u. beside an item signifies that the item was not used. An n.r. indicates that the instructor did not respond as to whether the job sheet or assignment sheet was used during the course. A g.a. signifies that the assignment sheet or job sheet was done as a group activity.

STUDENT ACHIEVEMENT

Unit I-A

Q 1a.	100
b.	100
c.	100
Q 2a.	100
b.	100
c.	100
d.	100
e.	100
Q 3a.	92.0
b.	92.0
c.	92.0
d.	92.0
e.	92.0
f.	92.0
Q 4a.	92.0
b.	92.0
c.	92.0
d.	92.0
e.	92.0
f.	92.0
Q 5.	92.0
Q 6a.	92.0
b.	92.0
c.	92.0
d.	92.0
Q 7a.	92.0
b.	92.0
Q 8.	n.r./A.S.

Unit II-A

Q 1a.	100
b.	100
c.	100
d.	100
Q 2a.	91.9
b.	98.4
c.	100
d.	100
e.	96.8
f.	93.5
g.	100
Q3 a.	100
b.	100
c.	100
d.	98.4
e.	100
Q 4a.	100
b.	100
c.	100
Q 4d.	98.4
e.	98.4
f.	98.4
g.	100
h.	100
i.	100
Q 5a1)	100
2)	98.4
b1)	96.8
2)	96.8
c1)	98.4
2)	98.4
d1)	98.4
2)	98.4
e1)	98.4
2)	98.4
f1)	98.4
2)	98.4
Q 6a.	96.8
b.	98.4
c.	96.8
d.	98.4
Q 7a.	98.4
b.	98.4
c.	98.4
d.	98.4
e.	98.4
Q 8a.	95.2
b.	95.2
c.	95.2
d.	95.2
e.	95.2
Q 9a1)	95.2
2)	95.2
3)	95.2
4)	95.2
b1)	95.2
2)	95.2
3)	95.2
4)	95.2
c1)	96.8
2)	96.8
3)	96.8
4)	95.2
Q10a.	95.2
b.	95.2
c.	95.2
Q11a.	95.2
b.	95.2

Q11c.	95.2
d.	95.2
Q12a.	69.4*
b.	79.0*
c.	67.7*
d.	85.5
Q13.	n.r., n.u./A.S.
Q14.	n.r., n.u./A.S.
Q15.	n.r., n.u./A.S.

Unit III-A

Q 1.	46.5*
Q 2a.	95.3
b.	83.7
c.	89.5
d.	97.7
e.	93.0
Q 3a.	95.3
b.	97.7
c.	87.2
d.	96.5
e.	88.4
Q 4a.	95.3
b.	95.3
c.	95.3
d.	98.8
e.	94.2
f.	96.5
g.	84.9
h.	83.7
Q 5a.	94.2
b.	100
c.	100
d.	91.9
e.	89.5
f.	86.0
g.	98.8
Q 6a.	91.9
b.	90.7
c.	80.2
Q 7a.	68.6*
b.	93.0
c.	73.3*
d.	84.9
e.	88.4
f.	66.3*
g.	67.4*
h.	94.2
i.	91.9
j.	91.9
Q 8a.	97.7
b.	89.5
c.	98.8
Q 8d.	95.3
Q 9a.	54.7*
b.	57.0*
c.	55.8*
d.	72.1*
e.	83.7
Q10a.	73.3*
b.	82.6
c.	87.2
d.	89.5
Q11a.	94.2
b.	94.2
c.	95.3
d.	94.2
Q12a.	91.9
b.	90.7
c.	87.2
d.	88.4
Q13a.	87.2
b.	94.2
c.	98.8
d.	98.8
Q14a.	98.8
b.	97.7
c.	93.0
d.	98.8
e.	84.9
f.	84.9
g.	90.7
h.	94.2
i.	61.6*
j.	96.5
Q15a.	97.7
b.	82.6
c.	90.7
d.	76.7*
e.	79.1*
f.	74.4*
g.	97.7
Q16a.	74.0*
b.	71.2*
c.	80.8*
d.	84.9
Q17a.	83.6
b.	60.3*
c.	64.4*
d.	60.3*
Q18a.	100
b.	65.8*
c.	76.7*
d.	89.5
e.	84.9
f.	89.5

Q18g.	76.7*
Q19a.	67.4*
b.	86.0
c.	87.2
Q20a.	75.6*
b.	79.1*
c.	62.8*
d.	79.1*
e.	76.2*
f.	67.4*
Q21a.	54.7*
b.	61.6*
c.	62.8*
d.	83.7
e.	73.3*
f.	65.1*
Q22a.	88.4
b.	86.0
c.	76.7*
d.	90.7
e.	89.5
f.	55.8*
g.	88.4
Q23a.	83.7
b.	64.0*
c.	67.4*
d.	62.8*
e.	75.6*
f.	66.3*
g.	54.7*
Q24a.	65.8*
b.	64.4*
c.	74.0*
d.	56.2*
e.	57.5*
Q25a.	66.3*
b.	86.2
c.	73.3*
d.	68.6*
e.	60.5*
f.	75.6*
g.	47.7*
h.	54.7*
Q26a.	41.9*
b.	40.7*
c.	46.5*
d.	66.3*
e.	44.2*
f.	39.5*
g.	51.2*
h.	45.3
i.	68.6*
Q27a.	n.r./J.S.
Q27b.	n.r./J.S.
c.	n.r./J.S.
d.	n.r./J.S.
e.	n.r./J.S.
f.	n.r./J.S.
g.	n.r./J.S.
h.	n.r./J.S.
i.	n.r./J.S.
j.	n.r./J.S.

Unit IV-A

Q 1a.	100
b.	72.0*
c.	100
d.	80.0
e.	88.0
f.	92.0
g.	80.0
h.	80.0
i.	76.0*
j.	84.0
k.	100
l.	84.0
m.	92.0
Q 2a.	100
b.	100
c.	100
d.	100
e.	100
Q 3a.	100
b.	100
Q 4a.	100
b.	100
c.	100
d.	100
e.	100
f.	96.0
g.	100
h.	100
i.	92.0
j.	100
k.	100
Q 5a.	92.0
b.	80.0
c.	68.0*
Q 6a.	76.0*
b.	96.0
c.	96.0
d.	60.0*
e.	80.0
f.	92.0
g.	80.0
h.	92.0

Q 6i.	100
j.	100
Q 7a.	92.0
b.	80.0
c.	56.0*
d.	56.0*
Q 8a.	64.0*
b.	88.0
c.	92.0
d.	64.0*
e.	84.0
f.	80.0
g.	92.0
h.	80.0
i.	88.0
Q 9a.	88.0
b.	68.0*
c.	68.0*
d.	40.0*
Q10.	88.0
Q11a.	100
b.	100
Q12a.	84.0
b.	92.0
c.	92.0
d.	84.0
Q13a.	88.0
b.	88.0
c.	80.0
d.	76.0*
e.	92.0
f.	80.0
g.	92.0
h.	80.0
i.	88.0
j.	88.0
k.	56.0*
l.	80.0
m.	88.0
Q14a.	72.0*
b.	68.0*
c.	96.0
Q15a.	88.0
b.	84.0
c.	92.0
d.	96.0
e.	80.0
Q16a.	96.0
b.	92.0
c.	92.0
d.	84.0
Q17a.	100
b.	100
Q17c.	100
d.	92.0
Q18a.	n.r./J.S.
b.	n.r./J.S.
c.	n.r./J.S.

Unit V-A

Q 1a.	91.7
b.	91.7
c.	87.5
d.	100
e.	91.7
f.	87.5
g.	87.5
h.	95.8
i.	95.8
Q 2a.	79.2*
b.	79.2*
c.	79.2*
d.	70.8*
e.	75.0*
f.	75.0*
g.	95.8
h.	100
i.	95.8
j.	100
k.	100
l.	100
m.	66.7*
n.	79.2*
o.	87.5
p.	100
q.	91.7
r.	100
s.	75.0*
t.	87.5
u.	70.8*
v.	75.0*
Q 3a.	50.0*
b.	50.0*
c.	70.8*
d.	62.5*
e.	87.5
f.	91.7
g.	87.5
h.	95.8
i.	100
j.	62.5*
k.	58.3*
Q 4a.	95.8
b.	95.8
c.	91.7
d.	91.7

Q 4e.	91.7
f.	75.0*
g.	62.5*
h.	58.3*
Q 5a.	95.8
b.	95.8
c.	91.7
Q 6a.	100
b.	100
c.	91.7
d.	95.8
e.	87.5
Q 7a.	91.7
b.	87.5
c.	95.8
d.	95.8
e.	91.7
f.	91.7
g.	100
Q 8.	70.8*
Q 9.	75.0*
Q10a.	75.0*
b.	75.0*
c.	79.2*
d.	83.3
e.	75.0*
f.	54.2*
g.	66.7*
h.	62.5*
Q11a.	n.r./J.S.
b.	n.r./J.S.
c.	n.r./J.S.
d.	n.r./J.S.

Unit VI-A

Q 1a.	100
b.	84.0
c.	96.0
d.	100
e.	92.0
f.	100
g.	96.0
h.	84.0
Q 2a.	100
b.	92.0
c.	100
d.	92.0
e.	100
f.	100
g.	100
h.	100
i.	92.0
j.	88.0
Q 2k.	92.0
l.	96.0
m.	92.0
n.	88.0
o.	100
p.	100
q.	100
r.	100
s.	100
Q 3a.	92.0
b.	96.0
c.	100
d.	80.0
e.	100
f.	76.0*
g.	96.0
Q 4a.	92.0
b.	88.0
c.	68.0*
Q 5a.	80.0
b.	92.0
c.	96.0
d.	80.0
Q 6a.	68.0*
b.	52.0*
Q 7.	76.0*
Q 8a.	88.0
b.	28.0*
c.	32.0*
Q 9a.	n.r./J.S.
b.	n.r./J.S.
c.	n.r./J.S.
d.	n.r./J.S.
e.	n.r./J.S.

Unit VII-A

Q 1a.	88.5
b.	96.2
c.	88.5
d.	100
e.	96.2
Q 2a1)	88.5
2)	80.8
3)	61.5*
b1)	84.6
2)	88.5
3)	76.9*
Q 3.	96.2
Q 4a.	100
b.	92.3
c.	96.2
d.	96.2
e.	92.3

Q 4f.	100
Q 5.	84.6
Q 6a.	96.2
b.	76.9*
c.	61.5*
d.	53.8*
e.	30.8*
Q 7a.	92.3
b.	84.6
c.	96.2
Q 8.	100 J.S.

Unit I-B

Q 1a.	97.9
b.	97.9
c.	93.6
d.	97.9
e.	95.7
Q 2a.	80.9
b.	77.7*
c.	76.6*
Q 3a.	75.5*
b.	81.9
c.	85.1
d.	85.1
Q 4a.	78.7*
b.	75.5*
Q 5a.	86.2
b.	87.2
c.	79.8*
d.	72.3*
Q 6a.	71.3*
b.	66.0*
c.	75.5*
d.	63.8*
e.	58.5*
Q 7a.	69.1*
b.	62.8*
c.	45.7*
d.	52.1*
e.	38.3*
f.	54.3*
g.	31.9*
Q 8a.	53.2*
b.	46.8*
c.	37.2*
d.	34.0*
e.	28.7*
f.	25.5*
g.	19.1*
h.	14.9*
Q 9a.	39.4*
b.	31.9*
Q 9c.	33.0*
d.	30.9*

Unit II-B

Q 1a.	100
b.	93.5
c.	98.1
d.	98.1
e.	94.4
Q 2a.	90.7
b.	92.5
c.	85.0
d.	94.4
e.	86.9
f.	92.5
g.	89.7
Q 3a.	75.7*
b.	63.6*
Q 4a.	87.9
b.	86.0
c.	84.1
d.	72.9*
e.	69.2*
f.	57.0*
g.	42.1*
Q 5.	71.0*
Q 6a.	62.6*
b.	47.7*
Q 7.	83.2
Q 8.	69.2*
Q 9a.	n.r., 97.0/J.S.
b.	n.r., n.u., 75*/J.S.

Unit II-B

	A.S. # 1
Q 1.	100
Q 2.	100
Q 3.	100
Q 4.	100
Q 5.	94.4
Q 6.	100
Q 7.	100
Q 8.	100
Q 9.	100
Q10.	100
Q11.	100
Q12.	100
Q13.	100
Q14.	94.4
Q15.	94.4
Q16.	94.4
Q17.	100
Q18.	94.4

Q19.	100
Q20.	100
Q21.	100
Q22.	100
Q23.	94.4
Q24.	94.4
Q25.	100

A.S. # 2

Q 1.	100
Q 2.	83.3
Q 3.	94.4
Q 4.	94.4
Q 5.	88.9
Q 6.	88.9
Q 7.	83.3
Q 8.	94.4
Q 9.	88.9
Q10.	66.7*

Unit III-B

Q 1a.	88.2
b.	93.1
c.	95.1
d.	94.1
e.	86.3
f.	88.2
Q 2a.	89.2
b.	84.3
c.	82.4
d.	65.7*
Q 3a.	87.3
b.	73.5*
c.	84.3
d.	66.7*
e.	64.7*
f.	93.1
Q 4a.	96.1
b.	92.2
c.	91.2
d.	91.2
e.	85.3
f.	70.6*
g.	55.9*
Q 5a.	74.5*
b.	73.5*
c.	61.8*
Q 6.	92.2
Q 7.	n.r., n.u., 100/J.S.

Unit III-B

A.S. # 1

Q 1.	100
Q 2.	100
Q 3.	72.2*
Q 4.	100
Q 5.	100
Q 6.	83.3
Q 7.	100
Q 8.	94.4
Q 9.	88.9
Q10.	100

Unit I-C

Q 1a.	77.8*
b.	65.4*
c.	82.7
d.	88.9
e.	93.8
f.	76.5*
g.	98.8
h.	69.1*
i.	90.1
j.	77.8*
k.	70.4*
l.	84.0
m.	93.8
n.	87.7
o.	91.4
p.	70.4*
q.	97.5
r.	55.6*
s.	96.3
t.	61.7*
u.	91.4
v.	86.4
w.	65.4*
x.	88.9
y.	80.2
z.	74.1*
Q 2.	51.9*
Q 3a.	77.8*
b.	80.2
c.	75.3*
d.	77.8*
e.	69.1*
f.	63.0*
Q 4a.	80.2
b.	77.8*
Q 5a.	81.5
b.	77.8*
c.	76.5*
Q 6a.	87.7
b.	87.7
c.	96.5
d.	82.5

Q 6e.	98.2
f.	98.2
Q 7a.	57.9*
b.	59.6*
c.	56.1*
Q 8.	77.2*
Q 9.	33.3*
Q10.	73.7*
Q11.	49.1*
Q12a.	93.8
b.	92.6
Q13a.	97.5
b.	96.3
c.	97.5
d.	92.6
e.	96.3
f.	93.8
Q14.	54.4*
Q15.	56.8*
Q16a.	38.6*
b.	40.4*
c.	52.6*
Q17.	40.4*
Q18.	43.2*
Q19.	32.1*
Q20a.	93.8
b.	98.8
c.	97.5
d.	93.8
e.	87.7
f.	76.5*
g.	92.6
h.	79.0*
i.	92.6
j.	92.6
k.	96.3
l.	97.5
m.	97.5
n.	96.3
o.	95.1
p.	100
q.	93.8
r.	98.8
s.	84.0
t.	100
u.	98.8
v.	100
w.	96.3
x.	98.8
y.	100
z.	97.5
Q21a.	89.5
b.	89.5
Q21c.	82.5
d.	86.0
e.	86.0
f.	87.7
Q22.	43.9*

Unit II-C

Q 1.	78.8*
Q 2a.	97.5
b.	97.5
c.	100
d.	97.5
e.	96.7
f.	99.2
g.	98.3
h.	99.2
i.	97.5
Q 3a.	89.3
b.	90.1
Q 4a.	89.3
b.	89.3
Q 5a.	86.0
b.	71.1*
c.	55.4*
Q 6a.	100
b.	97.5
c.	97.5
d.	98.3
Q 7a.	80.2
b.	66.1*
Q 8a.	94.2
b.	91.7
c.	95.9
Q 9a.	76.9*
b.	84.3
c.	58.7*
Q10.	67.8*
Q11a.	90.1
b.	89.3
c.	78.5*
Q12.	61.1*
Q13a.	J.S.
b.	J.S.
c.	J.S.
d.	J.S.
e.	J.S.
f.	J.S.

Unit III-C

Q 1a.	98.2
b.	86.0
c.	98.2
d.	98.2

Q 1e.	85.1
f.	98.2
g.	90.4
h.	96.5
Q 2a.	93.0
b.	93.0
c.	84.2
d.	74.6*
e.	57.0*
Q 3a.	100
b.	97.4
c.	98.2
d.	100
e.	100
f.	100
Q 4a.	96.5
b.	100
c.	99.1
d.	95.6
e.	96.5
f.	93.9
Q 5a.	65.8*
b.	70.2*
Q 6a.	63.2*
b.	37.7*
Q 7a1)	48.2*
2)	40.4*
b.	57.9*
Q 8a.	79.8*
b.	74.6*
c.	74.6*
d.	76.3*
e.	80.7
Q 9a.	70.2*
b.	66.7*
c.	57.9*
d.	46.5*
Q10a.	86.0
b.	75.6*
c.	72.1*
d.	66.3*
e.	52.3*
f.	40.7*
g.	37.2*
h.	33.7*
Q11a.	J.S.
b.	J.S.

Unit IV-C

Q 1a.	95.3
b.	95.3
Q 2a.	98.7
b.	98.7
Q 2c.	99.3
d.	99.3
e.	97.3
f.	98.7
g.	95.3
h.	98.7
i.	98.0
j.	97.3
k.	95.3
Q 3a.	84.7
b.	94.0
c.	89.3
Q 4a.	84.0
b.	84.0
Q 5.	48.0*
Q 6a.	99.3
b.	100
c.	86.0
d.	84.0
e.	86.7
f.	94.0
Q 7a.	98.0
b.	99.3
Q 8a.	87.3
b.	72.7*
Q 9a.	68.7*
b.	77.3*
Q10a.	63.3*
b.	44.2*
c.	35.0*
d.	64.2*
e.	53.3*
Q11.	42.5*
Q12a.	J.S.
b.	J.S.
c.	J.S.
d.	J.S.
e.	J.S.
f.	J.S.

Unit V-C

Q 1.	87.5
Q 2a.	77.5*
b.	72.5*
c.	60.0*
Q 3a.	97.5
b.	97.5
c.	97.5
d.	85.0
e.	95.0
f.	90.0
Q 4a.	65.0*
b.	60.0*

Q 5a.	82.5
b.	90.0
c.	80.0
d.	80.0
Q 6a.	97.5
b.	85.0
c.	82.5
Q 7a.	85.0
b.	95.0
c.	97.5
d.	90.0
e.	87.5
f.	87.5
g.	72.5*
h.	85.0
i.	82.5
j.	72.5*
k.	90.0
Q 8a.	82.5
b.	97.5
c.	87.5
d.	100
e.	95.0
f.	85.0
Q 9a.	100
b.	88.9
c.	83.3
d.	100
e.	50.0*
f.	44.4*
g.	77.8*
Q10.	22.2*
Q11a.	94.4
b.	88.9
c.	88.9
d.	55.6*
e.	44.4*
f.	38.9*
Q12a.	100, n.r./J.S.
b.	100, n.r./J.S.
c.	100, n.r./J.S.
d.	100, n.r./J.S.
e.	100, n.r./J.S.

Unit I-D

Q 1a.	98.3
b.	89.8
c.	91.5
d.	93.2
e.	89.8
f.	94.9
g.	88.1
h.	88.1
Q 1i.	96.6
j.	81.4
k.	98.3
Q 2a.	94.9
b.	94.9
Q 3a.	100
b.	86.4
c.	98.3
d.	100
e.	88.1
f.	100
g.	94.9
h.	93.2
i.	86.4
j.	96.6
k.	100
l.	88.1
Q 4a.	81.4
b.	79.7*
c.	72.9*
d.	61.0*
Q 5a.	84.7
b.	78.0*
c.	72.9*
d.	67.8*
e.	57.6*
Q 6a.	100, n.r./J.S.
b.	100, n.r./J.S.
c.	100, n.r./J.S.

Unit II-D

Q 1a.	86.2
b.	93.8
c.	95.4
d.	100
e.	84.6
f.	100
g.	90.8
h.	89.2
i.	90.8
j.	78.5*
k.	90.8
l.	89.2
m.	98.5
n.	95.4
o.	89.2
p.	95.4
q.	93.8
r.	100
s.	93.8
t.	93.8
Q 2a.	87.7
b.	78.5*

Q 3a.	84.6
b.	86.2
Q 4a.	87.7
b.	83.1
c.	90.8
d.	76.9*
e.	100
f.	81.5
g.	92.3
h.	87.7
i.	92.3
Q 5a.	60.0*
b.	60.0*
c.	56.9*
Q 6a.	55.4*
b.	69.2*
c.	61.5*
d.	52.3*
Q 7a.	72.3*
b.	84.6
c.	89.2
d.	72.3*
e.	93.8
f.	89.2
Q 8a.	58.5*
b.	58.5*
c.	90.8
d.	81.5
e.	84.6
f.	86.2
Q 9a.	66.2*
b.	73.8*
c.	64.6*
Q10.	36.9*
Q11a.	70.8*
b.	63.1*
c.	56.9*
Q12.	63.1*
	55.4*
	66.2*
	60.0*
Q13a.	92.3
b.	89.2
c.	86.2
Q14a.	89.2
b.	78.5*
c.	83.1
Q15a.	63.1*
b.	70.8*
c.	83.1
d.	69.2*
e.	69.2*
f.	87.7
Q15g.	80.0
Q16a.	n.r., n.u./J.S.
b.	n.r., n.u./J.S.

Unit III-D

Q 1a.	98.1
b.	98.1
c.	92.6
d.	92.6
e.	100
Q 2a.	98.1
b.	94.4
c.	94.4
d.	85.2
e.	81.5
Q 3a.	87.0
b.	83.3
Q 4a.	96.3
b.	98.1
c.	98.1
d.	94.4
e.	87.0
f.	75.9*
Q 5a.	94.4
b.	98.1
c.	98.1
Q 6a.	96.3
b.	94.4
Q 7a.	n.r./J.S.
b.	n.r./J.S.
c.	n.r./J.S.

Unit IV-D

Q 1a.	63.2*
b.	56.1*
Q 2a.	56.1*
b.	45.6*
c.	57.9*
d.	63.2*
Q 3a.	73.7*
b.	54.4*
Q 4a.	86.0
b.	94.7
c.	84.2
d.	91.2
e.	78.9*
f.	78.9*
g.	71.9*
h.	100
i.	75.4*
j.	70.2*
k.	75.4*
Q 5a.	70.2*

Q 5b.	66.7*
c.	89.5
d.	94.7
Q 6a.	33.3*
b.	38.6*
c.	21.1*
d.	38.6*
Q 7a.	73.7*
b.	94.7
c.	98.2
d.	98.2
e.	93.0
f.	96.5
g.	68.4*
h.	87.7
i.	86.0
Q 8a.	J.S.
b.	J.S.
c.	J.S.
d.	J.S.

Unit V-D

Q 1.	70.3*
Q 2a.	100
b.	97.3
c.	67.6*
d.	85.1
e.	87.8
f.	95.9
g.	87.8
h.	95.9
i.	89.2
j.	75.7*
Q 3a.	94.6
b.	98.3
c.	94.6
d.	89.2
e.	86.5
f.	86.5
g.	75.7*
h.	94.6
i.	79.7*
Q 4a.	82.4
b.	78.4*
c.	81.1
d.	79.7*
e.	79.7*
Q 5a.	74.3*
b.	66.2*
c.	58.1*
Q 6a.	87.8
b.	70.3*
c.	73.0*
Q 6d.	89.2
e.	97.3
f.	82.4
g.	90.5
h.	87.8
i.	83.8
j.	75.7*
k.	75.7*
l.	83.8
m.	78.4*
Q 7a.	71.6*
b.	71.6*
Q 8a.	50.0*
b.	52.7*
c.	50.0*
Q 9a.	n.r., 100/J.S.
b.	n.r., 100/J.S.
c.	n.r./J.S.
d.	n.r./J.S.
e.	n.r., n.u./J.S.

Unit VI-D

Q 1.	63.9*
Q 2a.	83.3
b.	91.7
c.	84.7
d.	91.7
e.	86.1
Q 3a.	84.7
b.	83.3
c.	73.6*
d.	81.9
e.	83.3
Q 4a.	84.7
b.	84.7
c.	86.1
d.	80.6
e.	80.6
Q 5a.	n.r., 66.7*/J.S.
b.	n.r., 66.7*/J.S.

Unit I-E

Q 1.	81.1
Q 2a.	94.7
b.	100
c.	100
d.	100
e.	91.6
f.	92.6
g.	90.5
h.	90.5
i.	91.6
Q 3a.	93.7

Q 3b.	95.8
c.	89.5
d.	93.7
e.	94.7
Q 4a.	83.3
b.	85.3
c.	65.3*
d.	91.6
e.	86.3
f.	91.6
g.	91.6
h.	88.4
Q 5a.	89.5
b.	80.0
c.	71.6*
d.	74.7*
e.	86.3
f.	77.9*
g.	93.7
h.	80.0
i.	84.2
j.	94.7
k.	96.8
Q 6a.	98.9
b.	98.9
c.	80.0
d.	98.9
e.	76.8*
f.	100
g.	80.0
h.	91.6
i.	96.8
j.	81.1
k.	78.9*
l.	100
m.	91.6
n.	88.4
Q 7a.	89.5
b.	88.4
c.	86.3
d.	89.5
e.	74.7*
f.	92.6
g.	91.6
Q 8a.	75.8*
b.	60.0*
c.	75.8*
d.	71.6*
e.	81.1
f.	85.3
g.	77.9*
h.	56.8*
i.	88.4
Q 8j.	63.2*
Q 9a.	64.3*
b.	67.1*
c.	75.7*
Q10a.	47.4*
b.	43.2*
Q11a.	J.S.
b.	J.S.
c.	J.S.
d.	J.S.
e.	J.S.
f.	J.S.
g.	J.S.

Unit II-E

Q 1a.	97.2
b.	99.1
c.	98.2
d.	86.2
e.	98.2
f.	89.0
g.	99.1
h.	97.2
i.	97.2
j.	99.1
Q 2a.	97.2
b.	86.2
c.	79.8*
d.	83.5
e.	87.2
f.	92.7
g.	91.7
h.	80.7
Q 3a.	77.1*
b.	85.3
c.	87.2
d.	93.6
e.	92.7
f.	79.8*
g.	87.2
Q 4a.	91.7
b.	91.7
c.	86.2
Q 5a.	82.6
b.	85.3
c.	71.6*
d.	85.3
e.	91.7
f.	86.2
g.	87.2
h.	84.4
i.	88.1
j.	82.6

Q 6a.	74.3*
b.	73.4*
c.	63.3*
d.	56.9*
e.	51.4*
Q 7.	44.0*
Q 8a.	81.7
b.	71.6*
Q 9a.	71.6*
b.	64.2*
Q10a.	62.4*
b.	63.3*
c.	79.8*
d.	34.9*
e.	52.3*
f.	79.8*
g.	76.1*
h.	64.2*
i.	57.8*
Q11a.	62.4*
b.	43.1*
c.	47.7*
d.	65.1*
e.	56.9*
f.	44.0*
g.	41.3*
h.	34.9*
Q12.	27.5*
Q13.	27.5*
Q14.	27.5*
Q15a.	71.6*
b.	67.0*
c.	62.4*
d.	58.7*
e.	52.3*
f.	41.3*
Q16a.	40.4*
b.	36.7*
c.	44.0*
d.	40.4*
Q17a.	48.6*
b.	56.0*
c.	53.2*
d.	56.0*
e.	44.0*
f.	38.5*
g.	53.2*
h.	54.1*
i.	38.5*
j.	56.9*
k.	58.7*
Q18a.	J.S.
b.	J.S.
Q18c.	J.S.
d.	J.S.

CORRESPONDENCE

This section contains copies of the unit evaluation form and letters which were sent to the auto mechanics instructors and their administrators.

Votech
OKLAHOMA STATE DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
FRANCIS TUTTLE, DIRECTOR • 1515 WEST SIXTH AVE., • STILLWATER, OKLAHOMA 74074 • A.C. (405) 377-2000

September 14, 1979

Dear Auto Mechanics Instructor:

The State Department of Vocational and Technical Education hopes the Auto Mechanics I curriculum guide will be of great assistance to you in your teaching experiences. We feel that the validity of the content is assured because of the extensive use of validation committees throughout the development of this manual. However, we recognize the need for validation of the manual in terms of student achievement. Therefore, we are administering a research study to see if the manual is helping the student to meet the designated performance objectives.

The Research Coordinating Unit of the State Department of Vocational and Technical Education is in the process of selecting teachers to participate in the validation. Selection of teachers will be partially based on the units that will be taught during the 1979-80 school year and the approximate dates they will be taught.

Enclosed you will find a copy of the Auto Mechanics I table of contents. Please take a few minutes to list the approximate dates you plan to teach each unit. In order to facilitate the research study, we are asking that you return the enclosed table of contents by September 26, 1979. A self-addressed, stamped envelope is provided for your convenience.

Your input in this study is extremely important and necessary for any future revisions. Should you be selected, you may rest assured that the recordkeeping will be minimal. We are looking forward to hearing from you.

Sincerely,

Sheila Stone

Sheila Stone, Assistant Coordinator
Research Coordinating Unit

Bill Litton

Bill Litton, Trade and Industrial Curriculum Specialist
Curriculum and Instructional Materials Center

Enclosure

AUTO MECHANICS I

Table of Contents

		Approx. Teaching Date
Section A--Orientation and Safety		
Unit I	Orientation	_____
Unit II	Safety	_____
Unit III	Hand Tools	_____
Unit IV	Arc Welding	_____
Unit V	Oxyacetylene Cutting	_____
Unit VI	Oxyacetylene Fusion Welding	_____
Unit VII	Oxyacetylene Braze Welding	_____
Section B--Measuring		
Unit I	Rules	_____
Unit II	The Outside Micrometer	_____
Unit III	The Inside Micrometer	_____
Section C--Engine		
Unit I	Basic Engine Principles	_____
Unit II	Cooling System	_____
Unit III	Engine Lubrication System	_____
Unit IV	Exhaust System	_____
Unit V	Fuel System	_____
Section D--Suspension		
Unit I	Wheel Bearings	_____
Unit II	Tires and Wheels	_____
Unit III	Wheel Balancing	_____
Unit IV	Suspension System	_____
Unit V	Steering System	_____
Unit VI	Wheel Alignment	_____
Section E--Brakes		
Unit I	Brake System	_____
Unit II	Power Disc Brakes	_____

Instructor's Name: _____

School Address: _____

_____

_____

Return to: Sheila Stone, Assistant Coordinator
Research Coordinating Unit
State Department of Vocational and Technical Education
1515 West Sixth Avenue
Stillwater, OK 74074

OKLAHOMA STATE DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
FRANCIS TUTTLE, DIRECTOR • 1515 WEST SIXTH AVE., • STILLWATER, OKLAHOMA 74074 • A.C. (405) 377-2000

October 9, 1979

MEMORANDUM

TO: Area School Administrators and Local Directors

FROM: Sheila Stone, Assistant Coordinator
Research Coordinating Unit

SUBJECT: Field Tests of Curriculum Manuals

The Curriculum and Instructional Materials Center and the Research Coordinating Unit of the State Department of Vocational and Technical Education are conducting field tests of the following curriculum manuals: Welding, Auto Mechanics I, Drafting, Health Services Careers, Nursing I, Family Living, Occupational Child Care, Agriculture Livestock Skills, Vocational Agriculture IV, and Interdisciplinary Cooperative Education. The purpose of these field tests is two-fold: 1) to validate the manuals in terms of student achievement of the performance objectives as stated in the curriculum and 2) to gather input from instructors to use in future revisions of these manuals.

Enclosed please find a copy of the letter which has been sent to all Oklahoma auto mechanics instructors. Similar letters have been sent to instructors using the other nine manuals. Due to an oversight, you were not notified of this project beforehand. We hope this has not caused you any inconvenience. Your support of this project is vital for its success.

We are in the process of selecting teachers for the field tests and would appreciate any encouragement you could give to your instructors to participate. In developing the procedures, we tried to work out a process that would not increase the teacher's workload. The assumption was made that the tests would be administered as they are in the manuals and that these tests would be graded item by item. The information we need on a student is his or her ability to answer a given item correctly. Therefore, we need to obtain the student tests graded to indicate right or wrong answers on each test item. Teachers may add or delete test questions, weight the items for a total score, or use any other procedures they normally use in testing. Each student will be assigned a number by the teacher to be used throughout the field test. The student should write that number in the upper left corner of the test instead of her or his name. Each school will also be assigned a number to be used for identification purposes.

Teachers will be asked to participate on approximately six units. A self-addressed, postage-paid envelope will be provided for each unit. A teacher evaluation form will also be provided for each of the six units. This form should take no more than five or ten minutes to complete and will be invaluable to the Curriculum and Instructional Materials Center in the development and revision of future manuals. A copy of this evaluation form will be sent to you as soon as it is available.

I hope this explanation will give you sufficent information about the project. If you have any questions, please feel free to call me at the State Department.

cc: Regional Administrators

SS/7626/10

OKLAHOMA STATE DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
FRANCIS TUTTLE, DIRECTOR • 1515 WEST SIXTH AVE., • STILLWATER, OKLAHOMA 74074 • A.C. (405) 377-2000

MEMORANDUM

TO:

FROM: Sheila Stone, Assistant Coordinator
Research Coordinating Unit

Thank you for agreeing to participate in the validation of the Auto Mechanics I manual. Without your cooperation, this study could not be done.

In developing the procedures, we tried to work out a process that would not increase your workload. The assumption was made that the tests would be administered as they are in the manuals and that these tests would be graded item by item. The information we need on a student is his or her ability to answer a given item correctly. Therefore, we need to obtain the student tests graded to indicate right or wrong answers on each test item. You may add or delete test questions, weight the items for a total score, or use any other procedures you normally use in testing. We are also asking that you indicate the student's performance on each assignment and job sheet. These performance objectives are listed at the end of each test.

An item by item analysis will be made from all student tests. Those items answered correctly by most of the students will indicate that the items are properly covered in the manual. Those items which the majority of the students answer wrong will indicate specific weaknesses in the manual. The school and students will be assigned numbers for identification purposes; no names will be recorded. All tests and assignment sheets will be returned to you.

A self-addressed, postage-paid envelope will be provided for each unit. The label in the lower corner of the envelope indicates what components of that unit need to be sent to us. In most cases, we require only the tests and completed evaluation form.

The steps to follow for field testing the units are attached for your convenience. We have also included a table of contents that specifies which units you will be validating. Keep these sheets available for future reference.

Thank you again for your cooperation. I would be happy to answer any questions you may have as the field testing progresses. Feel free to call or write to me at any time.

We would appreciate your participation on the following units. Also, if you have access to any of the unit tests given in August or September, please write the school number and student number on each one and send them in the extra envelope provided. Any inconvenience you may experience now should result in quality curriculum manuals and will benefit all of the programs in the future. Thanks again for helping us.

AUTO MECHANICS I

Table of Contents

		You are responsible for:
Section A--Orientation and Safety		
Unit I	Orientation	_____
Unit II	Safety	_____
Unit III	Hand Tools	_____
Unit IV	Arc Welding	_____
Unit V	Oxyacetylene Cutting	_____
Unit VI	Oxyacetylene Fusion Welding	_____
Unit VII	Oxyacetylene Braze Welding	_____
Section B--Measuring		
Unit I	Rules	_____
Unit II	The Outside Micrometer	_____
Unit III	The Inside Micrometer	_____
Section C--Engine		
Unit I	Basic Engine Principles	_____
Unit II	Cooling System	_____
Unit III	Engine Lubrication System	_____
Unit IV	Exhaust System	_____
Unit V	Fuel System	_____
Section D--Suspension		
Unit I	Wheel Bearings	_____
Unit II	Tires and Wheels	_____
Unit III	Wheel Balancing	_____
Unit IV	Suspension System	_____
Unit V	Steering System	_____
Unit VI	Wheel Alignment	_____
Section E--Brakes		
Unit I	Brake System	_____
Unit II	Power Disc Brakes	_____

Instructor's Name: _____

STEPS TO FOLLOW WHEN FIELD TESTING UNITS

1. Assign each student a number (between 1 and 99) to be used throughout the field test. The school number and student number should be written in the upper left corner of the first page of the test and on any assignment sheet we may request. Your school number is ☐

2. Teach the unit in your normal manner.

3. Administer the unit test from the curriculum manual.

4. Check (✓) each incorrect item on the test, preferably in red.

★ 5. Mark the performance items listed at the end of each test as follows:

   a. Mark "OK" on the performance objectives the student performed satisfactorily.

   b. Check (✓) those items that were not performed satisfactorily.

   c. Write "Not Used" or "Group Activity" where applicable.

6. Complete the unit evaluation form. Please be specific in your comments. This is your opportunity to tell what you like or dislike about the unit. We welcome your opinions.

7. Mail tests and unit evaluation form to our office, using our return envelope. We will record the data and mail the tests back to you within two weeks after we receive them. The evaluation form will be used by the Curriculum and Instructional Materials Center for future revisions.

UNIT EVALUATION FORM

School Number_____ Unit Name_____

We need your help? Is the CIMC curriculum material useful in meeting your program objectives? What needs to be improved? How can we improve it? What needs to remain the same?

Did you use:	Please check the appropriate column below: Yes	No	In Part	Directions: Please comment on each component with regard to your major reasons for using or not using that part of the unit. If your reason corresponds with one of the statements on the attached sheet, place the number of the statement in the space provided. Statement Number	OTHER COMMENTS
Unit of Instruction					
Objectives Page					
Suggested Activities					
Information Sheets					
Transparencies					
Assignment Sheets					
Answers to Assignment Sheets					
Job Sheets					
Test					
Answers to Test					

What are the most needed changes in this unit? What suggestions do you have for making the changes?_____

The Oklahoma State Department of Vocational and Technical Education does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, qualified handicap or disability.

Examples of Constructive Comments

Note: We need constructive feedback if we are to improve CIMC products. It is very important that we know why something is acceptable or not acceptable.

1. Effective in helping students to learn
2. Ineffective in helping students to learn

3. Facilities and equipment readily available or unnecessary
4. Facilities and equipment unavailable or inappropriate

5. Too elementary for student; too easy
6. Too advanced for student; too difficult

7. Lack available resources (e.g. films, supplementary materials, budget)
8. Have adequate or abundant resources

9. Have better materials available
10. Is the best available material

11. Incomplete
12. Complete

13. Current/up-to-date
14. Out-of-date/behind the times

15. Written in logical order; well-sequenced
16. Not logically written; sequencing poor

17. Thought-provoking
18. Unstimulating/unimaginative

19. Motivating
20. Unmotivating

21. Needed for successful employment
22. Unnecessary

23. Biased/stereotyped
24. Unbiased/not stereotyped

25. Easy for teacher to use
26. Difficult for teacher to use

27. Confident of technical knowledge myself
28. Lack technical knowledge/background/work experience

OKLAHOMA STATE DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
FRANCIS TUTTLE, DIRECTOR • 1515 WEST SIXTH AVE., • STILLWATER, OKLAHOMA 74074 • A.C. (405) 377-2000

January 31, 1980

MEMORANDUM

TO:

FROM: Sheila Stone, Assistant Coordinator
Research Coordinating Unit SS

JUST A REMINDER . . . . .

that we still need your cooperation in the Auto Mechanics I field test. This field test is being conducted now so that you will have quality materials for your program in the years to come. Won't you please help us help you???

The steps to follow when field testing the units are listed below. You should have received the return envelopes and unit evaluation forms in the past few months. If you have any questions or comments, please don't hesitate to call me at (405) 377-2000, extension 251. Thank you!!!

1. Assign each student a number (between 1 and 99) to be used throughout the field test. The school number and student number should be written in the upper left corner of the first page of the test and on any assignment sheet we may request. Your school number is _____.

2. Teach the unit in your normal manner.

3. Administer the unit test from the curriculum manual.

4. Check (✓) each incorrect item on the test, preferably in red.

*5. Mark the performance items listed at the end of each test as follows:

   a. Mark "OK" on the performance objectives the student performed satisfactorily.

   b. Check (✓) those items that were not performed satisfactorily.

   c. Write "Not Used" or "Group Activity" where applicable.

6. Complete the unit evaluation form. Please be specific in your comments. This is your opportunity to tell what you like or dislike about the unit. We welcome your opinions.

7. Mail tests and unit evaluation form to our office, using our return envelope. We will record the data and mail the tests back to you within two weeks after we receive them. The evaluation form will be used by the Curriculum and Instructional Materials Center for future revisions.

EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER